REMARKS

In response to the Final Office Action mailed November 6, 2008, Applicant respectfully requests reconsideration. Claims 1-21, 23-39 and 41-45 were previously pending in this application. No claims have been added, amended or canceled herein. As a result, claims 1-21, 23-39 and 41-45 remain pending for examination with claims 1, 8, 13, 25, 26 and 27 being independent. No new matter has been added.

Rejections Under 35 U.S.C. §102

The Office Action rejected independent claims 1 and 26 under 35 U.S.C. §102(b) as purportedly being anticipated by Shinoda (U.S. 4,779,036). Applicant respectfully traverses these rejections.

Claim 1 recites "applying to a switch gate of the SCR-type switch several periods of an unrectified high frequency voltage in succession, such that an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch." Shinoda does not teach or suggest these limitations. The Office Action alleges that the "accumulated effect" that purportedly starts the switch is inherent in the operation of Shinoda's device. Applicant respectfully disagrees because Shinoda's device turns on in response to receiving a pulse of sufficient power, not in response to an accumulated effect. The Office Action's inherency rationale is contrary to Shinoda's description of how the thyristor starts.

Shinoda uses the conventional technique for starting a thyristor in which a pulse of sufficient power is applied to the gate of the thyristor (Col. 5, line 53 – Col. 6, line 60). This conventional technique is explained in the present specification, in the last two paragraphs of page 3. Conventionally, when a voltage pulse is applied to the gate electrode, the pulse must be of sufficient amplitude to turn on a junction and of sufficient intensity to have a sufficient current flow through this junction. In other words, the pulse must have a given minimum power.

Shinoda applies a halfwave of sufficient intensity at the gate to start the thyristor (Col. 5, line 53 – Col. 6, line 60). Shinoda only repeats the triggering pulse in the form of a high frequency signal to provide redundant pulses in case the operation of the thyristor is impaired by poor environmental conditions.

Shinoda states:

> In a thyristor, in general, when a forward bias voltage is applied to the anode, the thyristor can be turned on if a gate signal is supplied to the gate for a short period of time. However, it may not be turned on in accordance with environmental conditions. If the thyristor is always used under good environmental conditions, such an erroneous operation cannot occur. However, good environmental conditions may impair economy. Even if the erroneous operation state occurs, when the gate signal is supplied not once but repetitively, the thyristor can be reliably turned on. (Col. 5 lines 56-68)

Shinoda clearly describes that each pulse has normally (in good environmental conditions) a sufficient amplitude and duration and that, if the pulses applied to the gate are repeated, one of the pulses will arrive at a suitable time so that the thyristor is turned on. Shinoda's switch turns on in response to receiving a pulse of sufficient power at the right time, not in response to an accumulated effect of applying several periods of an unrectified high frequency voltage in succession. Shinoda only applies several pulses in case one pulse fails to turn the switch on due to poor environmental conditions (Col. 5 lines 56-68). Each pulse operates independently of the other pulses, and there is no suggestion that Shinoda's pulses cooperate in any manner to turn on the switch. Shinoda's pulses are simply redundant and produce no accumulated effect.

The Office Action's rationale is that an accumulated effect necessarily causes Shinoda's thyristor to turn on because thyristors have parasitic capacitances. Applicant respectfully disagrees because the creation of an accumulated effect does not logically follow from the mere presence of parasitic capacitances. The Office Action relies upon Boylestad for the idea that parasitic capacitances are inherently present in Shinoda's thyristor. The Office Action also cites further references for this idea, including Durmont (4,459,531), Yakushiji (4,982,259), and Croft (5,546,038). Even assuming for the sake of argument that parasitic capacitances exist in Shinoda's thyristor, this fact alone is not sufficient to show that an accumulated effect is created in Shinoda's thyristor, much less that the accumulated effect turns on the thyristor.

The Office Action relies upon Boylestad as purportedly describing how an accumulated effect is created by parasitic capacitances. Applicant respectfully disagrees because the Office Action's rationale is incorrect from a technical perspective and unsupported by Boyelstad.

Boylestad describes capacitances present in a semiconductor diode, not an SCR. One of ordinary skill in the art would appreciate that Shinoda's thyristor is different from a semiconductor diode because Shinoda's thyristor has three terminals, yet Boylestad's silicon diode has only two terminals. Boylestad's silicon diode lacks the gate terminal which receives the pulse that turns on Shinoda's thyristor. Boylestad does not disclose an "accumulated effect" being present at the gate of an SCR because Boylestad's silicon diode has no gate terminal.

The Office Action's rationale for the production of an accumulated effect is as follows:

> According to Boylestad et al., with a forward (positive) bias the junction has a substantial value of a diffusion capacitance while a reverse (negative) bias it has much smaller value of a depletion capacitance. Since the capacitance is non-linear and dependent on a value of an applied signal, the junction is capable of accumulating predominantly positive charges due to its larger capacitance and therefore larger charge storage capability.

Applicant respectfully disagrees because so such disclosure is present in Boyelstad. For example, Boylestad does not disclose that the diode's junction accumulates predominantly positive charge. It is unclear from a technical perspective as to why Boylestad's diode junction would accumulate predominantly positive charges as the Office Action contends. This conclusion is in no way suggested by Boylestad or any other cited reference.

The Office Action also alleges that the junction of Boylestad's silicon diode produces a DC bias, based on the purported accumulation of positive charges. The Office Action states:

> The bipolar wave of the high frequency signal becomes DC biased due to accumulation of positive charges in the emitter-base junction of the SCR, a peak value of the signal wave rises higher.

Applicant respectfully disagrees because no such disclosure is present in Boylestad. Boylestad makes no mention whatsoever of a DC bias being created, much less that a DC bias is created at the gate terminal of an SCR. As discussed above, Boyelstad's silicon diode is a two-terminal device that does not have a gate terminal. The Office Action's statement regarding the creation of a DC bias is inconsistent with the physical structure of Boylestad's device, which does

not have an "emitter-base junction" because it is a silicon diode which has no base, nor a corresponding gate terminal. For at least these reasons, Boylestad does not support the idea that an "accumulated effect" is inherently created in Shinoda's thyristor.

To establish inherency, the Office Action must show that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art (MPEP 2112). The fact that a certain characteristic may occur or be present in the prior art is not sufficient to establish inherency (MPEP 2112). The Office Action has failed to meet its burden in the present case because it is clear that no accumulated effect is necessarily present in Shinoda's device. Contrary to the Office Action's rationale, Shinoda's device uses the conventional method of turning on the thyristor by applying a pulse of sufficient intensity. This technique is successful when environmental conditions do not impair the function of the thyristor (Col. 5 lines 56-68). No accumulated effect is used.

For these reasons, Shinoda does not expressly or inherently disclose "applying to a switch gate of the SCR-type switch several periods of an unrectified high frequency voltage in succession, such that an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch." Therefore, claim 1 patentably distinguishes over Shinoda. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-7 depend from claim 1 and are patentable for at least the same reasons.

Claim 26 recites, *inter alia*, that the SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves of the high-frequency control voltage but is not turned on in response to an effect of an individual one of the plurality of halfwaves. As should be appreciated from the above discussion, Shinoda does not disclose that an SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves. Accordingly, withdrawal of this rejection is respectfully requested.

Rejections Under 35 U.S.C. §103

The Office Action rejected independent claims 8 and 13 under 35 U.S.C. §103(a) as purportedly being unpatentable over Shinoda in view of Iwamuro et al., U.S. Patent No. 6,091,087. The Office Action also rejected independent claim 25 under 35 U.S.C. §103(a) as purportedly being

unpatentable over Shinoda in view of Nuckolls (3,344,310). In addition, the Office Action rejected independent claim 27 under 35 U.S.C. §103(a) as purportedly being unpatentable over Shinoda in view of Bhagat (4,630,092). Applicant respectfully traverses these rejections.

I. The Rejections Should be Withdrawn in View of Applicant's Unexpected Result.

MPEP 2144.05 states that the Applicant can rebut a *prima facie* case of obviousness by showing new and unexpected results with respect to the prior art. The present specification describes how the claimed invention provides a new and unexpected result. According to a common preconception, explained in the last paragraph of page 3, when positive and negative halfwaves are applied such that each halfwave itself is insufficient to turn on the thyristor, those skilled in the art thought that the effect of positive and negative halfwaves annuls and the A.C. signal has no triggering effect. By contrast, as explained in the fourth paragraph of page 4, Applicant found that, unexpectedly, an SCR can be switched by a high frequency signal while each halfwave of the A.C. voltage has a power and/or duration insufficient to ensure the switching of the considered SCR-type component. The specification states:

> A priori, when an A.C. signal is applied to the gate of a thyristor such that the power of each halfwave is insufficient to turn on the thyristor and that the duration of each halfwave is shorter than the component priming time, the effect of positive and negative halfwaves annuls and the A.C. signal has no switch starting effect.
>
> The applicant has however tried the experiment in a diagram of the type in Fig. 1, in which an HF signal is applied between gate G and cathode A of a thyristor. A D.C. voltage VAK of appropriate biasing is applied across the series assembly of a load and of thyristor TH. It is considered that cathode K of the thyristor is grounded.
>
> In Fig. 2, an HF voltage at a frequency of approximately 1 megahertz applied between the gate and the cathode has been shown by a curve 10 and the observed anode current has been shown by a curve 11. It should be noted that, after approximately three halfwaves of the high frequency AC. voltage, the thyristor conduction settles. Then, as conventional with a thyristor, the HF power supply can be interrupted and the thyristor remains conductive. (Page 3, line 31 - Page 4, line 13).
>
> [...]
>
> Thus, unexpectedly, when a high-frequency control voltage is

> applied to the gate of a thyristor, and more generally of an SCR-type switch, said switch is switched on while each halfwave of the AC. voltage has a power and/or a duration insufficient to ensure the switching of the considered SCR-type component. (Page 4, lines 20-23).

As described in the above-cited portion of the specification, the Applicant appreciated that applying several halfwaves of suitable frequency can turn on a thyristor, even if each halfwave alone has insufficient power to turn on the switch. This unexpected result is quite unlike Shinoda's technique of applying redundant pulses in case one pulse fails. In view of this unexpected result, the rejections under 35 U.S.C. §103 should be withdrawn.

II. The Claims Distinguish Over the Combinations.

Independent Claim 8

Claim 8 recites, *inter alia,* an SCR-type switch component that is configured such that the SCR-type switch component is not turned on in response to an individual one of the several periods, wherein the SCR-type component is configured such that an accumulated effect of applying the several periods in succession causes the SCR-type switch to turn on. As should be appreciated from the above discussion, Shinoda does not disclose that an accumulated effect of applying the several periods in succession causes the SCR-type switch to turn on. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 9-12 depend from claim 8 and are patentable for at least the same reasons.

Independent claim 13

Claim 13 recites, *inter alia*, providing, to a control terminal of the SCR-type switch, a high-frequency control voltage that controls the SCR-type switch without supplying current from the control terminal to a starting area of the SCR-type switch, wherein the high-frequency control voltage comprises a plurality of halfwaves, wherein the SCR-type switch is turned on in response to an accumulated effect of the plurality of halfwaves, an individual one of the plurality of halfwaves being of insufficient intensity and/or duration to start the switch by itself. As should be appreciated from the above discussion, Shinoda does not disclose an SCR-type that switch is turned on in

response to an accumulated effect of the plurality of halfwaves. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 14-21, 23 and 24 depend from claim 13 and are patentable for at least the same reasons.

Independent Claim 25

Claim 25 recites, *inter alia,* providing a high frequency control signal to a gate of the SCR-type switch that controls the SCR-type switch, the high frequency control signal having a frequency of 1 MHz or higher. The Office Action alleges that the high frequency control signal having a frequency of 1MHz or higher is purportedly disclosed at Col. 5, lines 67-68 of Shinoda. Applicant respectfully disagrees. This portion of Shinoda states that the control signal has a frequency of about 20 kHz, which is not 1 MHz or higher. In fact, the Office Action mailed February 20, 2008 concedes that Shinoda does not disclose this limitation of claim 1. Therefore, claim 25 patentably distinguishes over the combination of Shinoda and Nuckolls. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 44 and 45 depend from claim 25 and are patentable for at least the same reasons.

Independent Claim 27

Claim 27 recites, *inter alia*, an SCR-type switch that is turned on in response to an accumulated effect of a plurality of halfwaves of the high-frequency control voltage. As should be appreciated from the above discussion, Shinoda does not disclose an SCR-type switch that is turned on in response to an accumulated effect of a plurality of halfwaves. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 28-39 and 41-43 depend from claim 27 and are patentable for at least the same reasons.

CONCLUSION

In view of the foregoing, the present application is believed to be in condition for allowance. A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Date: March 6, 2009

Respectfully submitted,

By: _____

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